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ABSTRACT

The Mathematics Learning Center described in this report operates at Cerritos College (California) offering courses and individualized help in Basic Math, Elementary Algebra, Intermediate Algebra, and Trigonometry. The paper first discusses the center's enrollment, hours of service, and semi-independent delivery system, under which students independently, with tutorial aid, learn course content from texts or audio-tutorial materials and are tested at least once a week. The paper then examines the center's financial base, which is realized through the cost savings achieved by increasing the size of course sections and concomitantly decreasing the number of mathematics faculty and hiring paraprofessional personnel. After describing the center's staff organization and the tutorial and clerical duties of paraprofessional student aides, the paper details the record-keeping procedures used to document student test results and provides a sample student record sheet. Discussions follow of student attitudes toward the texts and audio-tutorial materials provided by the center and of the testing procedures used to monitor student progress. Finally, the paper outlines 15 tips for managing a learning center, including: don't give credit for attendance, don't overstaff, minimize student lines, insure that students understand standards and policies, and keep a special incident file. (JP)

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What We've Learned In Nine Years of Running a Learning Center

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WHAT WE'VE LEARNED IN NINE YEARS OF RUNNING A LEARNING CENTER

The mathematics learning center at Cerritos College is in its ninth year of operation. In this article, I would like to pass along a few of the things we have learned during that period.

ORGANIZATION OF THE MLC

Our math learning center teaches four courses: Basic Math, Elementary Algebra, Intermediate Algebra and Trigonometry. The total enrollment in all courses is about 700 students per semester. The courses are taught using a method which we describe as semi-independent study. After the opening day, no lectures are given. Students learn most of the course content from the textbooks which are supplemented by audio tapes.

The center is open from 8:30 am to 9:00 pm Monday through Thursday. It also open 9 am to 4 pm on Friday and Saturday. At any time during this period individualized help is immediately available to a student from a teacher or an instructional aide. Students take a minimum of one test per week which is graded in their presence by an instructional aide. A minimum score of 80% is required on each unit to insure that a student has mastered the material and that success on later units is probable.

HOW TO FINANCE A LEARNING CENTER

Basically a learning center is financed by increasing the number of students per teacher. The money saved by not hiring more teachers is then spent to hire paraprofessionals. At Cerritos the normal load for an instructor is 15 units per semester. Maximum size of a lecture section in math is forty students. The math learning center is organized into six sections with the equavalent of eighty-five students taking four units. Each of the large

sections is only four teaching units, therefore, there are 270 extra students or 6.75 extra sections to finance instructional aides. If the math learning center did not exist, it would be necessary to hire teachers for 4 units x 6.75 sections = 27 teaching units per semester. And

$$\frac{\text{27 teacher units}}{\text{15 normal teaching load}} = 1.80 \text{ teachers}$$

The budget for a new teacher at Cerritos is $19,880 for salary, plus $2532 for health benefits, plus $ 1590 for retirement for a total of $24,002. To hire 1.8 teachers would then cost $43,204. Since it's easier to sell a profit making operation than a break even operation to your local administrator, the MLC at Cerritos runs on a paraprofessional budget of $37,285. A summer session is also run without additional funds.

These funds are used to pay instructional aides at 5.59 per hour and student aides at 3.42 per hour.

STAFFING A LEARNING CENTER

Most individual assistance and test grading is done by instructional aides. These aides are generally students from the local four year colleges who have completed the calculus sequence and at least one upper division mathematics course. These requirements may seem stringent for a person who is going to answer questions dealing with arithmetic through trigonometry. However, we have found that this level of achievement is needed before the aide can confidently answer trigonometry and intermediate algebra questions delivered in random order.

The primary duties of an instructional aide are to grade tests and answer student's questions. The instructional aides analyze the tests on a continuing basis and suggest any needed changes. The answer keys are updated by the instructional aides.

Our aides generally work from ten to twenty hours per week. Beyond twenty hours per week fringe benefits must be paid.

Student assistants are Cerritos College students. A minimum requirement to become a student assistant is completion of mathematics through Intermediate Algebra. Their primary duties are to pass out the tests, record grades, do typing, and other clerical tasks. They are paid $2.59 per hour. Frequently, as student assistants complete the required math courses they are hired as instructional aides.

During scheduled class periods there is one teacher, three instructional aides and one student assistant on duty. It is generally agreed that for successful individual attention the ratio of students to staff must not exceed ten to one. Those of you who are quick with arithmetic will notice that there are only five staff members for eighty students or a sixteen to one ratio during regularly scheduled class time. Recall, however, that the students are not required to attend during regular class. They may come in any time that the center is open. Consequently the ratio of students to staff never exceeds ten to one in practice. The minimum level of staffing is one instructional aide and one student assistant which occurs from four to five p.m. daily.

PECORD KEEPING

The primary thing to remember about recording data is do it only once. Before you do that ask "Do I really need to keep this record at all?"

The only basic record is the student record sheet. Below is a sample.

Student no. _____ Name (last) _____ (first) _____ Course No. _____ Ticket No. _____

TEST NO.	PRETEST		FORM A		FORM B		FORM C		FORM D	
1	9-26	90								
mult. facts	9-26	75			9-27	100				
2	9-27	95								
3	9-30	70	10-2	90	"					
⋮	⋮		⋮		⋮		⋮		⋮	
20			12-1	76					12-3	98
Final Exam										

85.3
11|938

Total # of test pts. _____ Overall average _____

Total # of tests _____ Course grade _____

Test average _____

Notice that the students address and telephone are not included in the information we feel we need.

In a semi-independent class, it is the student's decision when to take a test not the teacher's. When a student asks for a test the student assistant randomly chooses one of the four forms available. The date is then recorded in the proper column of the student record sheet. At this time the student assistant also verifies that the student has achieved a minimum score of 80% on the previous test. The student then completes the test in the testing area under the supervision of the student assistant at the front desk. When the student completes the test, he takes it to one of the instructional aides for

grading. The instructional aide grades the test in the student's presence and answers any questions at this time. The aide collects the test and all scratch paper. The test is placed in a box, and the scratch paper is thrown out. The date and time the test was checked out is written on the test. When grading the test the instructional aide checks for any irregularities.

During the quiet periods the student assistant records the test score on the student record sheets next to the date that the test was checked out. Recall that the date the test was handed out is already on the record sheet and only the blank for the score needs to be filled in. This method provides a check against students taking tests but not returning them for grading.

Another activity for student assistants is to total the test points and average the grades on the record sheets. A students average is the sum of all grades, including those that are below criterion, divided by the total number of tests taken. This policy helps prevent students taking tests before they are prepared. After the last score averaged, a line is drawn across the record sheet. A notation is made in the margin. For example the notation on the right of the record sheet indicates that eleven tests were taken with a total of 938 points and an average of 85.3%. To continue the process new test scores are added to the previous total. This keeps both the instructor and the student informed. It also reduces the clerical burden at the end of the semester.

When a student completes a course his or her final grade is computed immediately. This eliminates any need to post grades or otherwise inform the student of his course grade before the registrar gets report cards out. As

the end of the semester approaches, student assistants transfer a summary of the grades of students who have completed the course into the instructors grade book. Total number of tests taken, test average, final exam grade and final grade are the only items recorded in the instructors roll book.

After the test score has been recorded the tests are filed by unit number and form. This provides a convenient way to examine overall student performance on any particular test when it is due for revision. If the test of a particular student is desired, it can be found by identifying the form of the test the student took from the students record sheet and then searching through the thirty or fewer papers in that folder. We keep the completed tests for a period of one year in case of a dispute.

The record sheets for the entire center reduce to three binders. These are kept for a period of five years. At any time during this period we have a minimum of sixteen test scores plus a midterm and a final score for each student to justify a course grade.

INSTRUCTIONAL MATERIAL

It seems to be a prerequisite, that to be called a learning center, something besides books need to be used for instruction. Audio tapes are the most popular with the teachers. The students however, don't seem to be so impressed. We use the audio tutorial algebra books published by Merrill. We find that even though they are designed to be used while listening to an explanatory tape less than half of the students listen to the tape. This is also true of the basic math material which was written by the authors of this article. Most people read at 250 to 300 words per minute. They speak at about 100 to 150 words per minute. We suggest that this difference is the primary reason students prefer reading to listening.

Tapes do serve a useful purpose. They provide psychological support for the student who lacks confidence. They also offer another means of instruction for the student that needs to go over each topic several times and would otherwise totally occupy a teacher's or instructional aide's time.

Instructional material should be arranged so that students cover one unit per week. This provides a visible milestone against which progress can be measured. It also provides early warning if students start to fall behind schedule so that the instructor may intervene.

We have found four forms of each test to be adequate to prevent students conspiring to attain for-knowledge of the tests. With sixteen tests plus a midterm and final it is possible to test every objective in the course. Therefore there is no purpose in hiding the objectives covered in each test from the students. At the end of each unit is a practice test which lets the students see if they have mastered the objectives of the unit. Our tests are just alternate forms of this test with the numbers changed. We do require a minimum score of 80% on each test before the student can proceed to the next unit.

When criteria for mastery is imposed on each unit it is necessary to have a plan that tells what will be done for the students who do not master a unit. Our first recourse is usually personal instruction by a teacher or instructional aide. We also have a drawer full of supplementary explanations and additional problems for the topics that students find difficult.

Other aids such as Harper Row Materials, Power Pacs, and SRA cards are also useful.

PITFALLS TO AVOID

Don't give credit for attendance

Base your grades upon demonstrated mastery of subject matter. How, when or where your students learn the material shouldn't be part of the grade.

Don't let it last forever

Most learning centers start off with the concept that students should be able to take as long as they like to finish a course. As the centers develop experience they learn that procrastination is the major obstacle to success. As students stretch a course out they forget what they learned in the beginning. Consequently, mature centers rarely grant permission to take longer than one semester to complete a course.

The term self-paced (as used in many Learning Centers) should be avoided, since it suggests working at any pace, preferably as slowly as possible. The term independent study helps avoid the problem of procrastination. Emphasize that work must be done outside of class as well as in the center. It takes as much time to prepare lessons, take tests and complete the work as it does in a traditional lecture class. Students should be urged to take the final exam as soon as they have finished all units. They do not have to wait until final exam week to take the final exam.

Avoid lines like the plague

The success of semi-independent learning requires that students can get help when they need it. This means that the hours of the instructional aides need to be tailored to the times the students want help. If a student has to stand in line for help, he is quite likely to drop the course.

Don't overstaff

In your zeal to avoid lines you may find that there are periods like from 3 to 5 p.m. when the staff outnumbers the students. Unless the staff is kept reasonably busy they tend to turn the place into a social center. Students are reluctant to intrude on a conversation to ask for help.

Don't fool yourself

If a student does not achieve the minimum grade on a test do not allow him to repeat the test that day. If you do, chances are the student will mechanically repeat the procedures the Instructional Aide demonstrated five minutes earlier and will pass. However, when the next unit comes the knowledge will be long gone from short term memory.

HELPFUL HINTS

Keep paper to a minimum

The best way to do this is to ask yourself what horrible consequences will happen if I don't keep this record. How often will they happen.

Give a pretest on learning center organization

Instead of taking roll the first day have the student fill out a short quiz on your policies, schedule, and grading standards. It's one way to get them to read your handouts.

Drop them a postcard

When students fall behind schedule send them a postcard with an appropriate warning or threat. This can bring back people you haven't seen in a while. Your computer center can probably provide you with a set of mailing labels for all students in your classes.

Make a list of staff phone numbers

Besides being nice for Christmas card lists this allows you to tell the instructional aides that except in emergencies they should arrange their own substitutes. We allow Instructional Aides to take off to study for an exam, etc., if they can find someone else to cover for them. If they can't find a substitute we remind them that they agreed to work those hours when they took the job.

Keep control of your budget

If you are the teacher in charge of the learning center you should be the one to decide who works when and what their qualifications are to be. Don't let your local administrator decide how many aides you should have at 11 a.m. on Tuesday.

Leave tracks

You're no longer running a single teacher classroom. Get everybody in the habit of writing brief notes about half done jobs or what needs to be done next. If a student assistant finds that you're low in a particular test, a note needs to be written now. Have Instructional Aides initial all test grades. This not only makes them official but lets you know who to go to in case of a question.

Solve learning problems while they are small

Encourage students to ask questions as soon as they have them. This way you get a short, specific, easy to answer question that satisfies both the teacher and the student. If students keep plowing ahead after things are fuzzy you will get questions like "I don't understand Unit Six." About all you can do in this case is tell the student to go back to the start of the unit and show you the first thing he did not understand.

Bulletin notices

A chalk-board is a convenient place to leave information for the students regarding units to be completed during a particular week, the number of weeks remaining in a semester or the final date that the center will be open.

Keep a special incident file

With more than one teacher and many Instructional Aides communication about special incidents with students can be a problem. One specific example is dismissals for cheating. While these are rare in our center, the actual incident is usually observed by someone other than a teacher. We ask the aide involved to get a witness to the infraction, if possible, before the student is confronted. We also ask the witnesses to write brief descriptions of the incident. This is filed with the student record sheet and any other evidence to substantiate the dismissal. Remember it is quite likely that two years from now the aides involved won't be around to testify. If they are around they won't recall details.

Color code the tests and record sheets

If there is more than one course taught in the learning center, print all material (tests, record sheets, grading policies, etc.) for each course on a different colored paper. This will reduce clerical errors and speed filing.

SUMMARY

Since the classes in the math learning center always close first at registration, we presume the center is popular with students. The math learning center drop out rate is comparable to the rate for the corresponding lecture classes. We can't confirm or deny our claim that since math learning center students must learn to mastery, they learn more than students in traditional classes. We do believe, that since students may freely choose either the math learning center or a traditional class, The presence of a math learning center helps make students ~~are~~ happier with the math program at Cerritos College.